

REMARKS

Applicants respond herein to the Office Action mailed September 19, 2006. Reconsideration is requested in view of the remarks below.

Background

Applicants appealed the Examiner's final rejection of claims 1 through 5, 7 through 10, 12 through 17, 19 through 21, and 26 through 30, to the Board of Patent Appeals and Interferences (the "Board"). Appeal No. 2005-2075. On November 18, 2005, the Board issued a decision wherein the Examiner's rejections under 35 U.S.C. §§ 102 & 103 were procedurally reversed, and new rejections were set forth pursuant to 37 C.F.R. § 41.50(b).

Applicants chose to reopen prosecution, and timely submitted an amendment in accordance with the Board's suggestions. The Examiner rejected applicants' claims on new grounds in a May 23, 2006 Office Action. Applicants traversed these rejections in a July 20, 2006 response. The Examiner declined to enter applicants' response, so applicants submitted a Request for Continued Examination. The July 20, 2006 response was then entered, and the Examiner issued the September 19, 2006 office action, to which applicants provide response herein.

35 U.S.C. § 103 Issues

The May 23, 2006 office action rejected claims 1-5, 7-10, 12-17, 19-21, and 26-30 as being unpatentable over Gwyn in view of Farnan (U.S. Patent No. 5,456,023). Applicants July 20, 2006 response addressed these rejections in their entirety. Applicants presume that the July 20, 2006 comments were persuasive, as the Examiner has rejected these claims under newly cited art.

Claims 1-5, 7-10, 12-17, 19-21, and 26-30 now stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Gwyn (U.S. Patent No. 4,397,422) in view of Holt (U.S. Patent No. 5,501,397). Applicants respectfully traverse.

Applicants continue to submit that the Gwyn patent is merely directed to a non-analogous paint-spraying device for mixing and spraying different colorants utilizing a venturi mixer system.

The Examiner states that the specification fails to limit the definition of the term "'chemical vapor deposition' and Gwen "is analogous art in that the deposition of paint meets the literal definition of 'chemical vapor deposition'." September 19, 2006 Office Action, p.4.

Applicants disagree. The specification is replete with direct application to chemical vapor deposition for the semiconductor arts, including the injection of TEOS, which would not be found in paint spraying applications.

In a chemical vapor deposition (CVD) process, species in the vapor phase are injected over a substrate (or wafer) and react to form a deposit on the substrate. Often, this is done with plasma enhancement (PECVD). This technique provides for superior coverage of complex topographies on the substrate surface.

Specification, p.1, ll.9-12.

The present methods in the art used to inject a carrier fluid (gas) such as tetraethylorthosilicate (TEOS) along with precursors and dopants into the gas manifold leading to the reactor chamber is inefficient and does not fully vaporize the injected fluids, especially the TEOS.

Specification, p.2, ll.16-19.

The cross-flow injector operating under the conditions set forth in Table 1 above for helium would allow the introduction of TEOS and other dopant fluids at a relatively high pressure (29.2 psia), and would not require the use of capillary tubes to create a pressure differential. The choked, narrowed throat provides this needed pressure differential. Helium is used mainly to offset the auto-ignition concerns with TEOS.

Specification, p.13, l.30 - p.14, l.4.

Two criteria have evolved for determining whether prior art is analogous: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved. In re Clay, 23 USPQ2d 1058, 1060 (Fed. Cir. 1992) (citing, In re Deminski, 796 F.2d 436, 442, 230 USPQ 313, 315 (Fed. Cir. 1986); In re Wood, 599 F.2d 1032, 1036, 202 USPQ 171, 174 (CCPA 1979)).

Clearly, the cited art for spray painting automobiles, as taught in Gwyn and Holt, is not within the same field of endeavor as the semiconductor arts. Moreover, applicants respectfully submit that the Examiner's characterization of the problem is broader than the particular problem with which applicants were involved. Applicants endeavor to inject a carrier fluid (gas) such as tetraethylorthosilicate (TEOS) along with precursors and dopants into the gas manifold leading to a reactor chamber for semiconductor processing. Specification, p.2, ll.16-19. This endeavor places the problem that applicants are attempting to solve out of the field of automobile spray guns and tents.

Precise definition of the problem is important in determining whether a reference is from a nonanalogous art. Defining the problem too narrowly may result in excluding consideration of relevant prior art. By the same token, defining the problem too broadly, as done here, may result in considering prior art as "analogous" which is inconsistent with real world considerations. Ex parte Dussaud, 7 USPQ2d 1818, 1819 (BPAI 1988); see also Panduit Corp. v. Dennison Mfg. Co., 774 F.2d 1082, 227 USPQ 337 (Fed. Cir. 1985), vacated, 475 U.S. 809, 229 USPQ 478 (1986), aff'd on remand, 810 F.2d 1561, 1 USPQ2d 1593 (Fed. Cir. 1987).

Furthermore, the Examiner has not responded to applicants' argument that the meaning of the term dopant intended by the inventors, i.e., for the deposition of reactants and other dopants within a chemical vapor deposition chamber, is within the common meaning of the term. One of ordinary skill in the semiconductor arts would not interpret the term dopant to include dyes or paints, as neither are reactants that alter the properties of a pure substance. Inherent in the application of a chemical vapor deposition chamber is the understanding that the mixed dopants create an atmosphere within the entire chamber for application of the depositing material. A person of ordinary skill in the art would not use a paint spray gun to create an atmosphere of dopant material within an entire chamber. By its application, the paint spray gun of Gwyn is a directional device.

Applicants further note, *arguendo*, that even if the cited art of Gwyn and Holt were considered analogous, the combination would be inappropriate for an obviousness-type rejection. Holt teaches a recirculating paint supply system with substantially flexible recirculating fluid conduit connected at one end to a spray gun and the other end to supply and return lines. Holt, col. 2, ll.49-54. Semiconductor processing does not lend itself to recirculating gases and dopants.

To the extent the Examiner is simply using the Holt design as a disclosure of a chemical vapor deposition chamber, applicants respectfully disagree with this combination. First, applicants note that the Examiner again chose to combine a paint spray gun with a paint spray booth. These apparatus are in related fields (analogous art), and a suggested combination is at least plausible. The paint spray gun and paint spray booth are not, however, in the chemical vapor deposition art for semiconductor processing. Importantly, paint spray booths are not semiconductor processing chambers. Applicants submit that it

would not be appropriate to combine the paint spray gun of Gwyn with a chemical vapor deposition chamber commonly used to treat semiconductors, nor applicants note, has the Examiner attempted to do so. The paint spray booth of Holt would not work as a chemical vapor deposition chamber for receiving an atmosphere of mixed dopant that would allow for the simultaneous and uniform deposition of a material on a substrate. "The walls of the spray booth are formed from rectangularly shaped pads of removable plastic so that walls may be cleaned by simply removing the layers of film." Holt, col. 7, ll.22-24. Dopants and carrier gases used in the semiconductor arts (such as TEOS) would dissolve the plastic walls of the Holt booth. Moreover, the Holt booth is not a chamber in the sense of how one is used to apply dopants in the semiconductor arts. A vacuum cannot be applied therein, nor can positive pressure be sustained. "As shown, a product to be painted such as an automotive vehicle 90, is moved through the spray booth by a conveyor system 92." Holt, col. 7, ll.21-22. The Holt booths are open-air enclosures, not chambers.

Additionally, for a number of other reasons stated in applicants' previously filed amendments, which applicants incorporate herein by reference, applicants respectfully submit that the prior art of Gwyn does not teach, suggest, or disclose the particular aspects claimed by the present invention.

To further distinguish the present invention, applicants have amended the claims to require that the chamber be a chemical vapor deposition chamber for processing semiconductor substrates. The Holt booth cannot meet this requirement.

The Examiner has also stated that claim 5, which defines the first and second chemical vapor deposition dopants comprising TEOS, is not restrictive because dopants are not positively cited in claim 1. Applicants respectfully disagree. Clearly, the apparatus and

chamber of claim 1 are designed for chemical vapor deposition of dopants for the semiconductor arts. The restriction of claim 5 that the dopants comprise TEOS places a limitation on the structure of the apparatus and chamber, i.e., they must survive a hostile dopant environment. The Holt booth cannot accommodate this environment. Moreover, Holt specifically teaches having a human within its booth applying paint. Holt, Fig. 5. Such a condition precedent could not be tolerated if TEOS and other semiconductor processing dopants were being introduced at their normal temperatures and pressures. Applicants submit that claims 5, 17, and new claim 31, specifically limiting the type of apparatus and chamber structures to accommodate TEOS delivery, are sufficient to distinguish the present invention over the cited prior art of Gwyn and Holt.

The Examiner notes with respect to claims 2 and 14 that the angle being forty to sixty degrees would have been obvious to one having skill in the art to have provided such an angle distribution for optimization. Applicants disagree. It is not true that those having skill in the automobile spray painting arts would require optimization of a paint spray gun for delivery of semiconductor processing gases and dopants. The angles have been designed and optimized for semiconductor substrate deposition. Such optimization would certainly not be found nor necessarily required for automobile painting. Similarly, with respect to the optimization of having a critical Mach Number of 1.0, as claimed in claims 3 and 15, the prior art cited by the Examiner remains completely silent on these aspects.

Applicants respectfully submit that the claims, as amended, bring the application into a condition for allowance.

Respectfully submitted,



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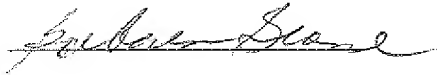
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